

TANAIDACEA (CRUSTACEA: PERACARIDA) OF THE GULF OF MEXICO.
IV. ON *NOTOTANOIDES TRIFURCATUS* GEN. NOV., SP. NOV., WITH A KEY
TO THE GENERA OF THE NOTOTANAIIDAE

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ABSTRACT *Nototanoides trifurcatus* gen. nov., sp. nov. is described and illustrated from the Gulf of Mexico. *Nototanoides* differs from the other genera of the family by the male possessing a vestigial maxilliped. It most closely resembles the genera *Nototanaïs* and *Androtanaïs*. In addition to the differences of the maxillipeds the males of *Nototanoides* can be separated by the 4-segmented antenna 1 and the females are distinguished by the trifurcate spine on the second segment of the palp of the maxilliped. A key to known genera of the family Nototanaidae is presented.

Sieg and Heard (1983) reported the tanaidacean *Teleotanaïs gerlachi* Lang, 1956, from the west coast of Florida, constituting the first record of the family Nototanaidae. Sieg, 1976, from the Gulf of Mexico. Recently, specimens of a second member of this family, representing a new genus and species, have been made available to us by David K. Camp and Eric N. Powell. These specimens were collected on hard bottoms in both the eastern and western Gulf of Mexico.

Nototanoides gen. nov.

Diagnosis — With eyelobes; antenna 1 of female 3-segmented, in male 4-segmented. Female mandible with strong *pars molaris*; endite of maxilla 1 with 9 terminal spines, palp with 2 setae distally; maxilliped without coxa, basis fused medially, endite also fused medially. Males with mandibles, maxilla 1, maxilla 2, and labium greatly reduced, unrecognizable; maxilliped vestigial with basis and endite fused medially; epignath present. Female marsupium formed by 4 pairs of oostegites. Sexual dimorphism of cheliped not well marked, but distinctly larger in male. Pereopods 4-6 with dactylus and terminal spine coalesced to claw. Five pairs of pleopods, endopod with distal setae on inner margin. Uropods biramous, endopodite 2-segmented.

Type-species: *Nototanoides trifurcatus* sp. nov.

Gender: Masculine.

Etymology — The ending *-oides* indicates that this genus is related to *Nototanaïs* Richardson, 1906.

Remarks — *Nototanoides* is placed in the family Nototanaidae because the basis of the maxilliped is fused medially, the dactyl and terminal spine of pereopods 4-6 are coalesced to form a claw, the uropodal endopod is only 2-segmented and the eyelobes are well developed. It is excluded from the Leptocheliidae Lang, 1973, because the

members of that family are characterized by having an unfused maxilliped and the endopod of the uropod consisting of 3 or more articles (see Sieg 1984a). *Nototanoides* cannot be included in the Paratanaidae Lang, 1949, because the members of this family have the basis as well as the endite of the maxilliped typically enlarged and the male differs totally in body shape from the female.

The general body structure, armament of pereopods, and general shape of antenna 1 indicate that *Nototanoides* is most closely related to the nototanaid genera *Androtanaïs* Sieg, 1973, and *Nototanaïs*, *Androtanaïs*, known only from the male, is characterized by having (1) antenna 1 with 5 articles, (2) only remnants of the maxilla present, and (3) a nearly normally developed maxilliped (only the endite reduced) with medially fused basis. The male "cheliped" of *Androtanaïs* indicates sexual dimorphism, unless the female is atypical for the family. This opinion is supported by the fact that the male "cheliped" of *Androtanaïs* is subchelate while in the known females of the other nototanaid genera it is chelate. In *Nototanaïs* the male also has an antenna 1 of 5 articles, but the third article is much shorter than in *Androtanaïs*. *Nototanaïs* is also characterized by having a relatively normal maxilliped with the endite unfused. Sexual dimorphism of the cheliped is quite apparent. In males development of the propodus, fixed finger, and sometimes the carpus is much more pronounced and enlarged than in females. *Nototanoides* differs from *Androtanaïs* and *Nototanaïs* by the male having an antenna 1 with 4 articles (third article very small), less sexual dimorphism of the chelipeds (the male cheliped is much larger and stronger than that of the female but otherwise similar), and a strongly reduced male maxilliped (basis small and fused medially, palp lacking, endite fused). In the female of *Nototanoides*, the endite of maxilla 1 has only 9 terminal spines instead of 10 as in *Nototanaïs*. As in *Androtanaïs*, the endite of the maxilliped is almost totally fused in *Nototanoides*. By contrast, males of *Nototanoides* and *Nototanaïs* have greatly reduced mouthparts with only the reduced palp of maxilla 1 remaining.

KEY TO THE GENERA OF THE FAMILY NOTOTANAIIDAE

1. Antenna 1 with more than 4 articles (mouthparts reduced except maxilliped) 2
 Antenna 1 with at most 4 articles 4
2. Antenna 1 with 8 articles (peduncle with 3 and flagellum with 5 articles), body extremely attenuated
 *Tanaissus* Norman and Scott (males)
 Antenna 1 with 5 articles, body not extremely attenuated 3
3. Last 3 joints of antenna with groups of aesthetascs, third joint annular *Nototanaïs* Richardson (males)
 Only the last joint bearing one aesthetasc distally, third joint elongate *Androtanaïs* Sieg (males)*
4. Antenna 1 with 4 articles 5
 Antenna 1 with 3 articles 6
5. Second and third segments of antenna subequal, third segment lacking aesthetascs, mouthparts present
 *Teleotanaïs* Lang (females)**
 Third segment of antenna 1 annular, distinctly shorter than second segment, with a group of aesthetascs; mouthparts
 including the maxilliped reduced *Nototanaïdes* gen. nov. (males)
6. Pleopods well developed 7
 Pleopods reduced *Metatanaïs* Shiino (females)**
7. Eyelobes present 8
 Eyelobes absent 9
8. Maxilliped with endite unfused medially, a short seta near articulation of palp, segment 2 of palp with ciliate spine;
 maxilla 1 with endite bearing 10 terminal spines *Nototanaïs* (females)
 Maxilliped with endite fused proximally, only distal third unfused, 1 long seta near articulation of palp, segment 2 of
 palp with strong trifurcate spine; maxilla 1 with endite bearing 9 terminal spines *Nototanaïdes* gen. nov. (females)
9. Endite of maxilliped fused medially *Tanaissus* (females)
 Endite of maxilliped unfused medially *Protanaissus* Sieg (females)**

*Female unknown

**Male unknown

Nototanaïdes trifurcatus sp. nov.

Holotype — Female, National Museum of Natural History, USNM 222507; off Texas coast, East Flower Garden Bank, 72 m, Gollums Lake, Sta. 80-24, 27°54'36.64"N, 93°34'53.27"W.

Allotype — Male, National Museum of Natural History, USNM 222508; same locality as holotype.

Paratypes — 1 ♀ + 2 ♂♂ in collection of Sieg and 16 ♀♀, 5 ♂♂, 1 manca-III, USNM 222509; same locality as holotype; 8 ♀♀ + 2 neuters, USNM 216175; East Flower Garden Bank, 120 m, 22 June 1975; 6 ♀♀ + 3 ♂♂, East Flower Garden Bank, Gollums Lake, Sta. 80-19, USNM 216176; 1 neuter, 1 ♀, 2 ♂♂, same locality, Sta. 80-R9, USNM 216177; 1 ♀, East Flower Garden Bank, Dive 6, USNM 216178.

Additional material — Texas Hard Bank Study: 1 ♀, Geyor Bank, 27°49'24"N, 93°03'42"W, 190 m, USNM

216179; 2 ♂♂, off Texas coast, Sackett Bank, 100 m, 28°38'01"N, 89°33'22"W, USNM 216180; Project Hour Glass (Florida West Coast): 1♀, Sta. L, 26°24'00"N, 83°22'00"W, 54.9 m, USNM 216182; Sta. D, 27°37'00"N, 83°28'00"W, 36.6 m, 1 ♀, USNM 216182; Sta. E, 27°37'00"N, 84°13'00"W, 73.2 m, 2 ♀♀, USNM 216182; Sta. C, 27°37'00"N, 83°28'00"W, 36.6 m, 1 ♀ + 1 ♂, FSBC-I-31419, 2 ♀♀ + 1 ♂, FSBC-I-31418; BLM Mississippi-Alabama-Florida Study: Sta. 2207, 27°57'00.4"N, 83°09'00.3"W, 19 m, 1 juv.; Sta. 2423, 29°37'00.8"N, 84°17'00.2"W, 19 m, 1 ♀; Sta. 2852, 28°30'00.4"N, 83°29'58.4"W, 22 m, 1 juv. + 1 ♀, all USNM 216183.

Description of female (paratype) (Figs. 1–7).

Body — Length of adult females from 3.0–3.5 mm; subadults and manca stages smaller; somewhat less than 5.5 times longer than broad (Fig. 1).

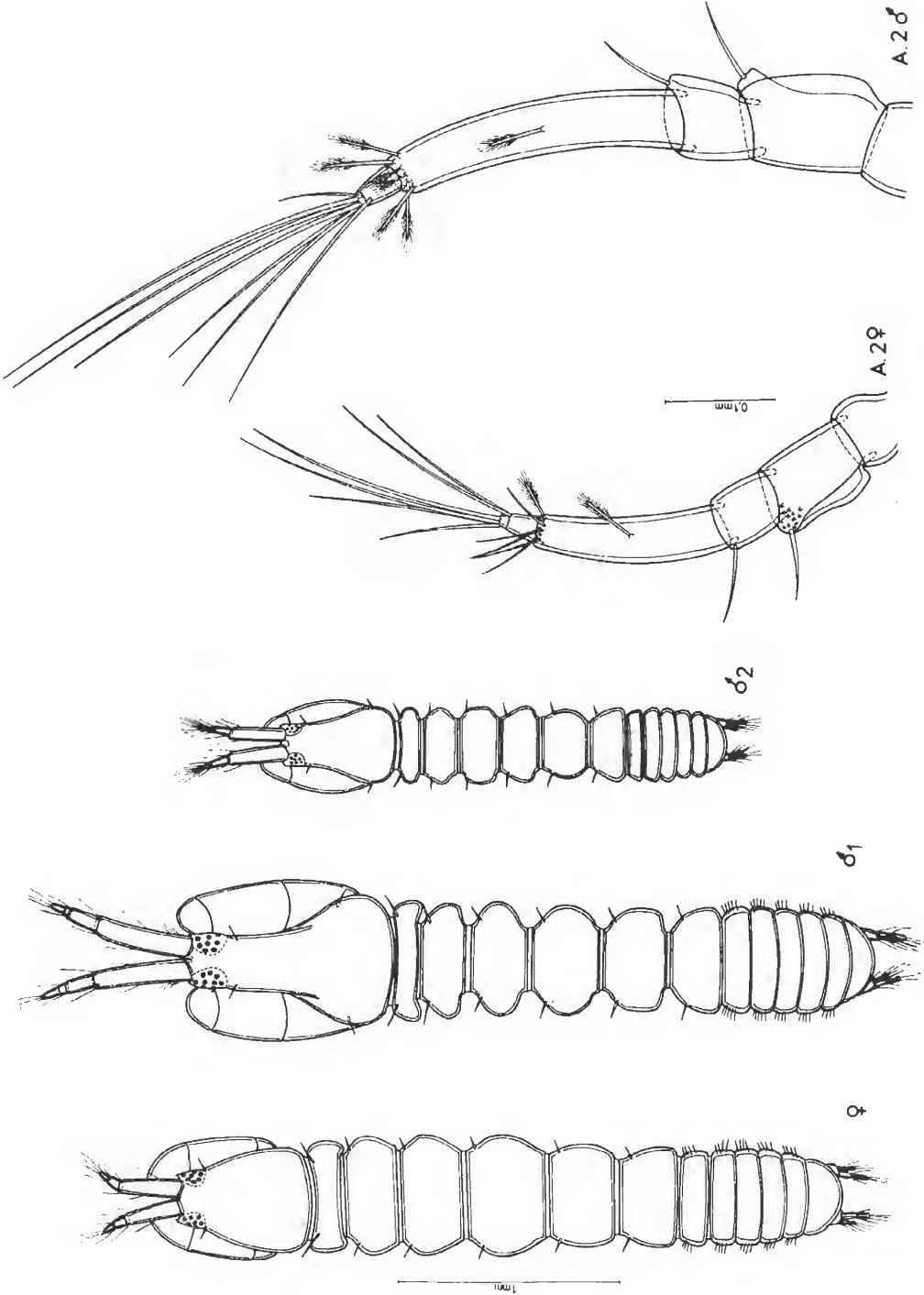


Figure 1. *Nototanaoides trifurcatus* gen. nov., sp. nov. Dorsal aspect of female, male 1 and male 2 (pereopods excluded); Antenna 2 (A.2) of female and male.

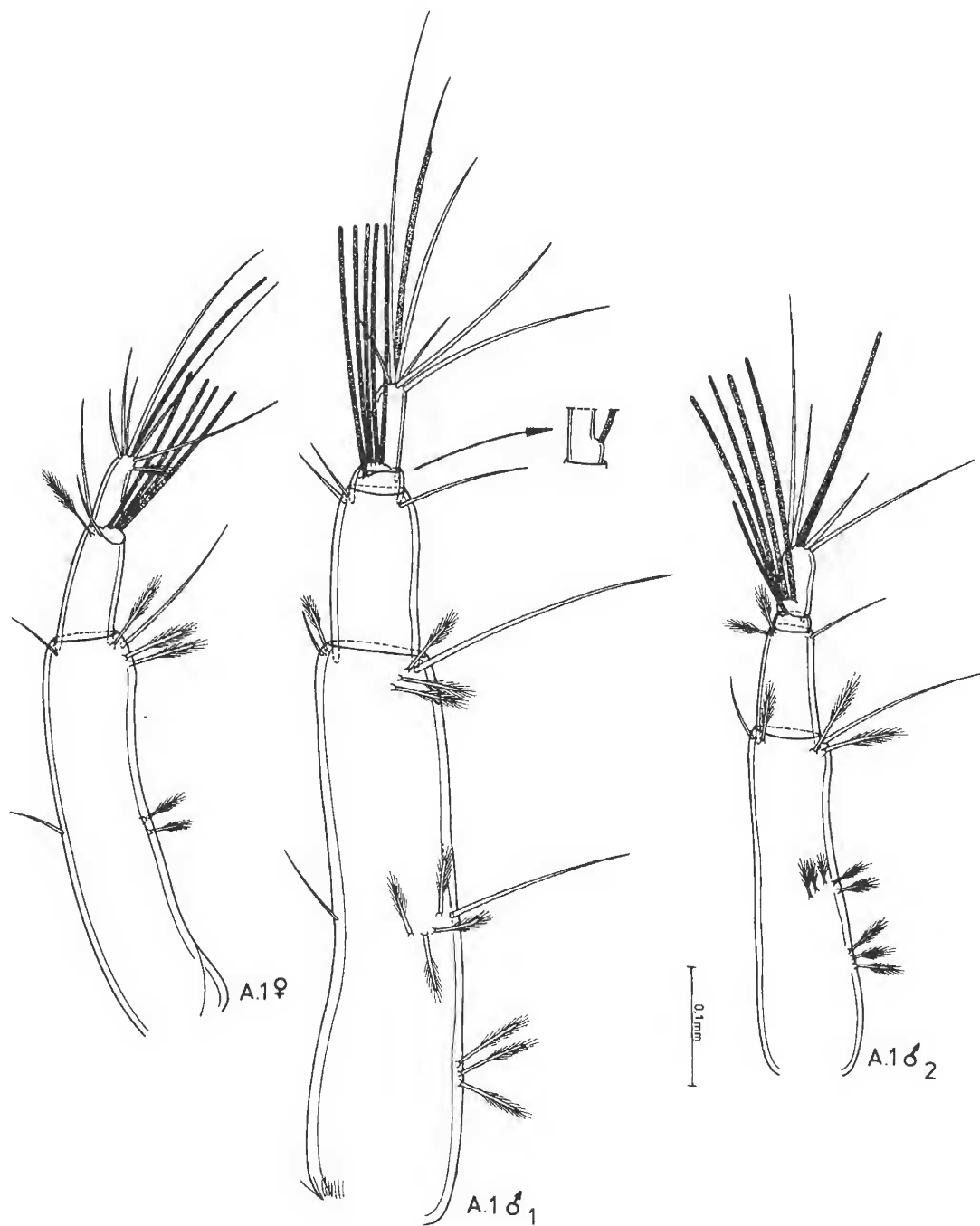


Figure 2. *Nototanoides trifurcatus* gen. nov., sp. nov. Antenna 1 (A.I) of female, male 1 and male 2.

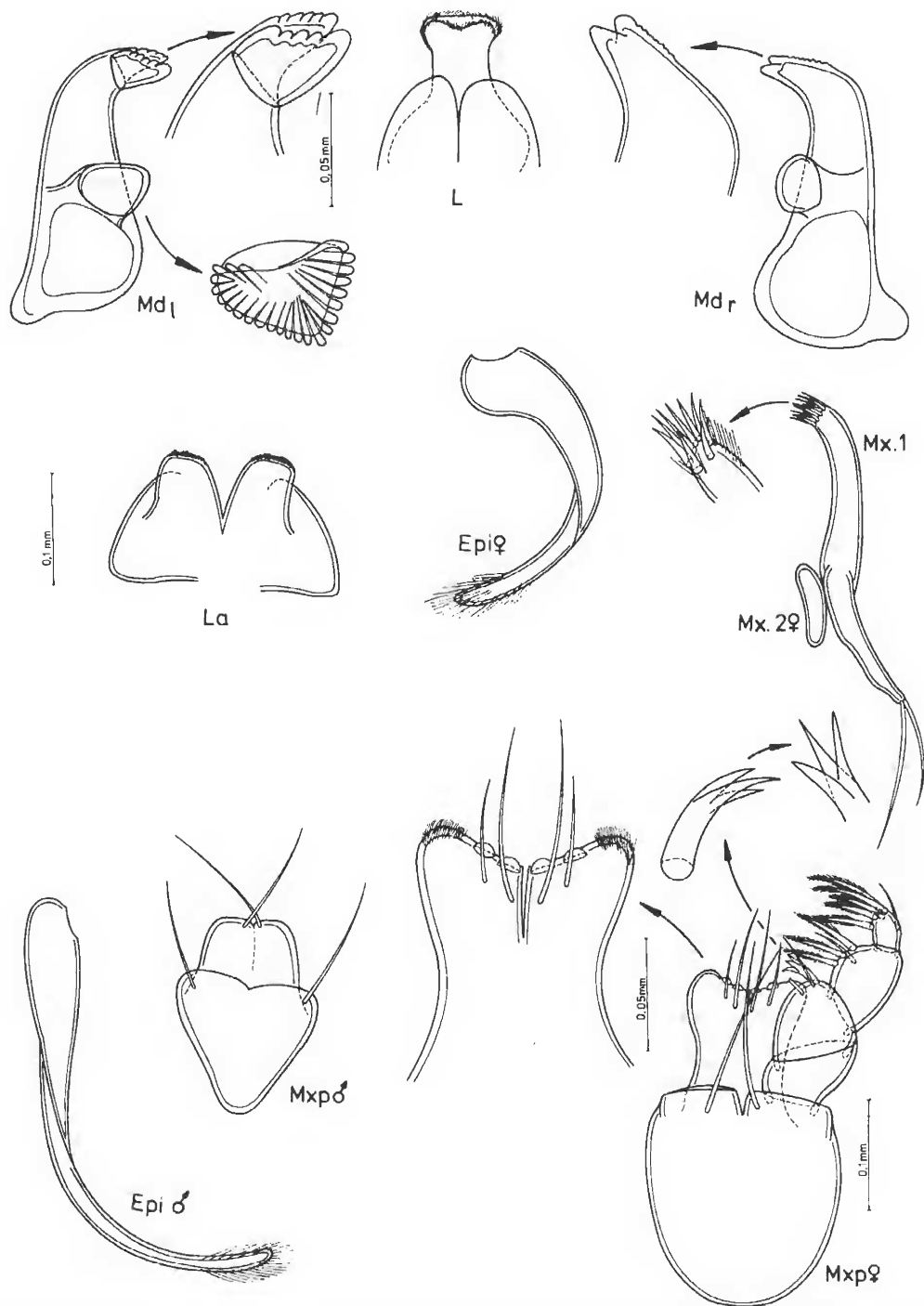


Figure 3. *Nototanoides trifurcatus* gen. nov., sp. nov. Female: right (Md r) and left (Md l) mandibles, labium (L), epignath (Epi), maxilla 1 (Mx. 1) and maxilla (Mx. 2), labrum (La), and maxilliped (Mxp). Male: epignath and maxilliped.

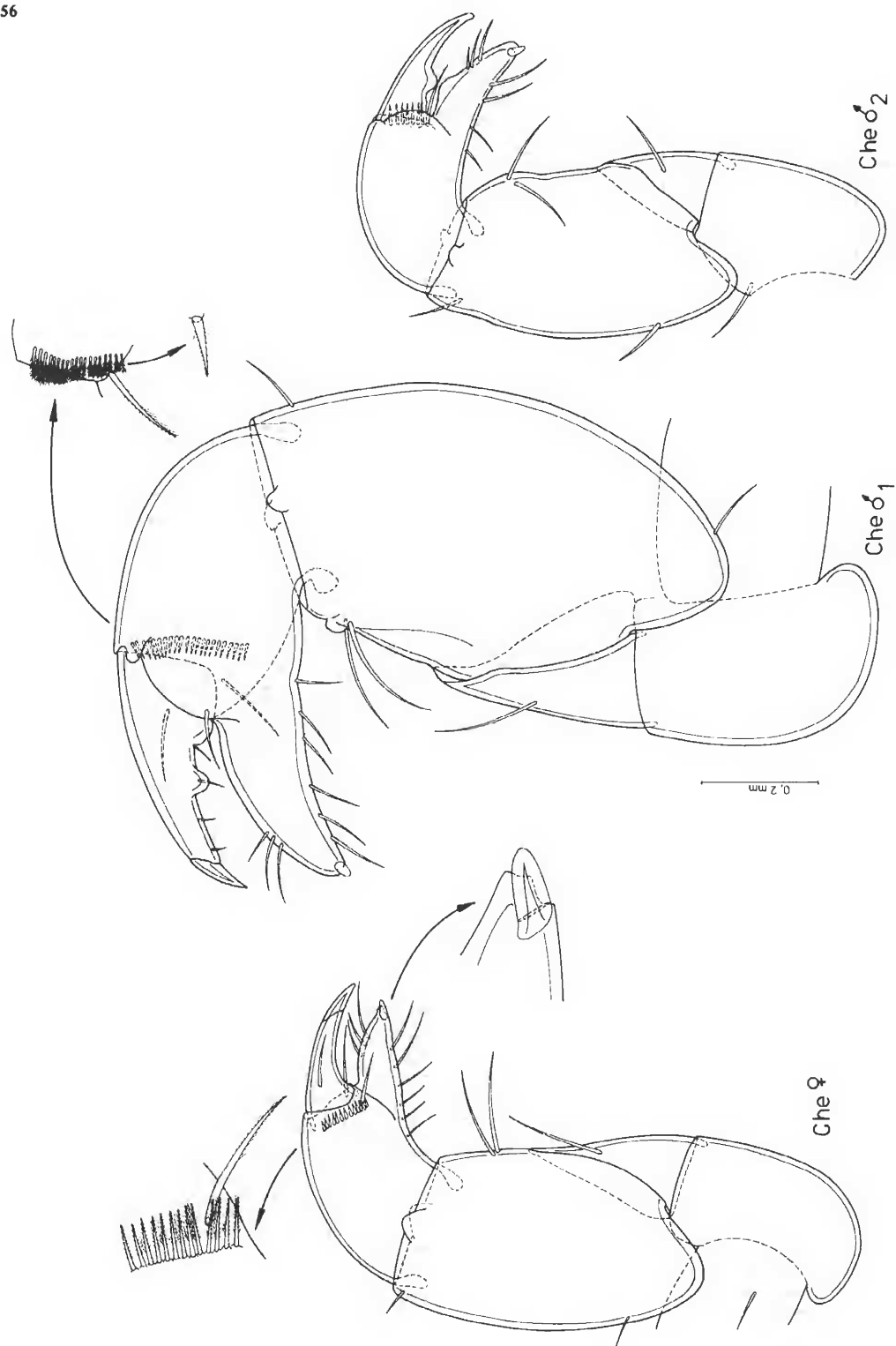


Figure 4. *Nototanoides trifurcatus* gen. nov., sp. nov. Chelipeds (Che) of female, male 1 and male 2.

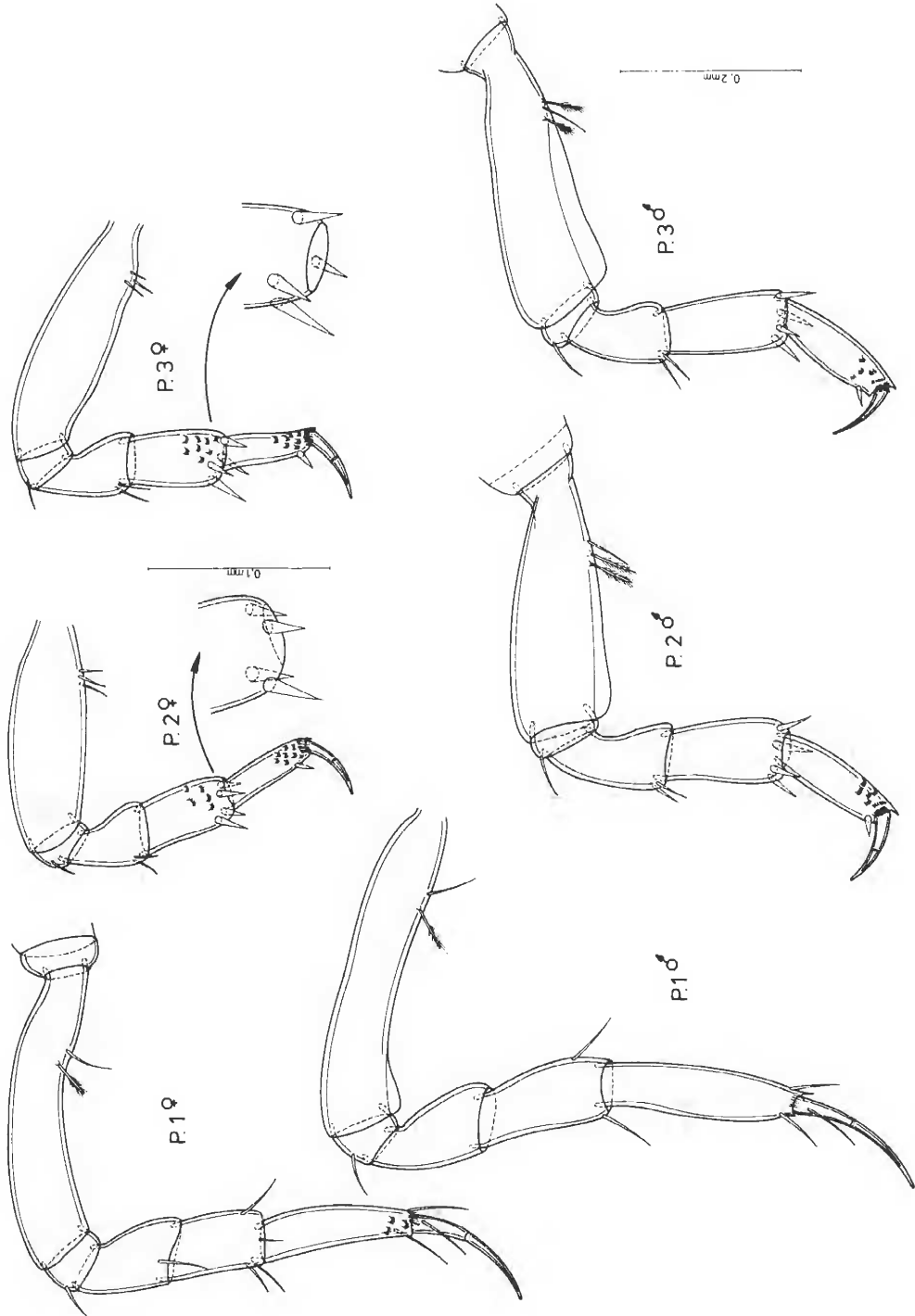


Figure 5. *Nototanoides trifurcatus* gen. nov., sp. nov. Pereopods 1–3 of female and male.

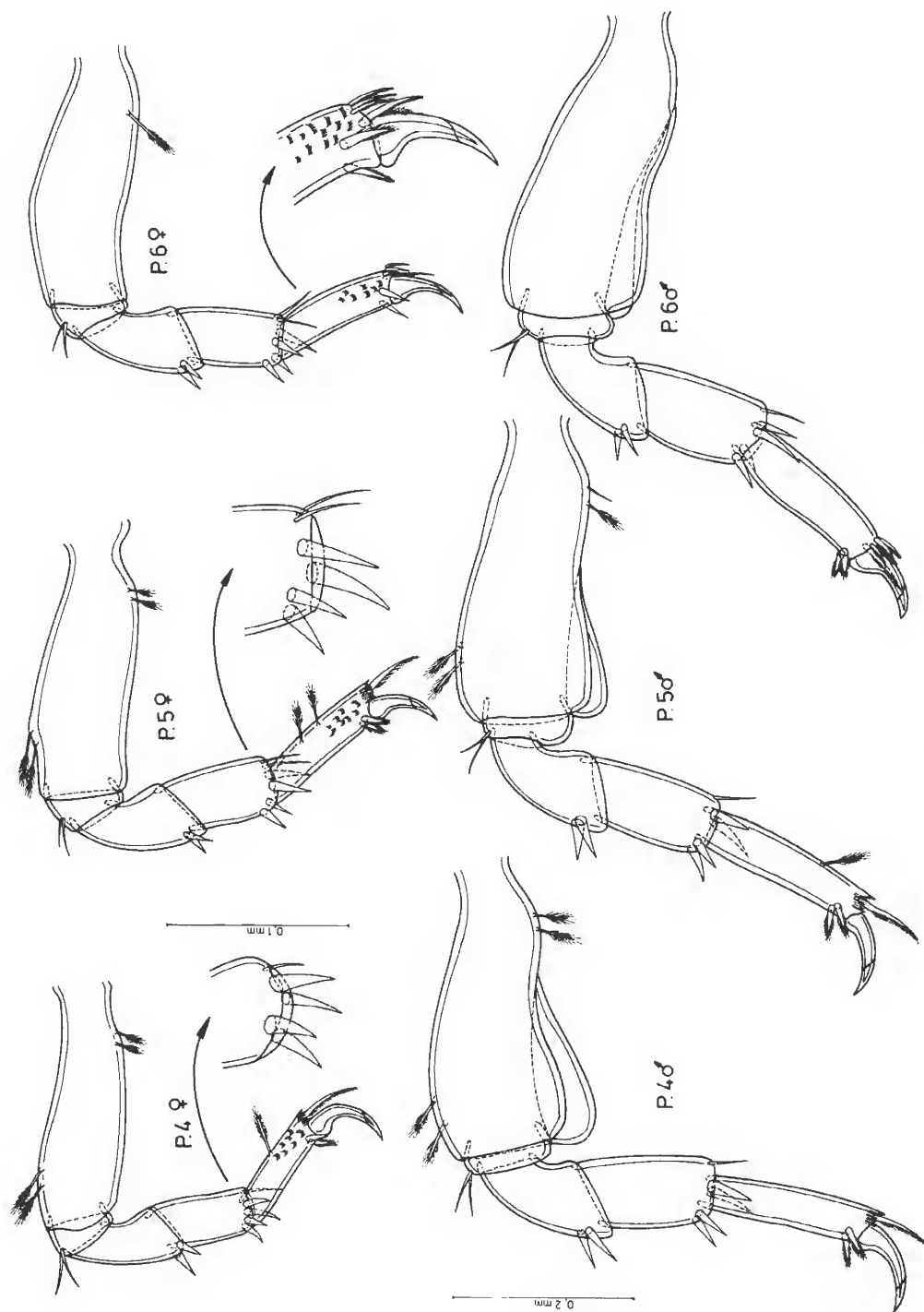


Figure 6. *Nototanoloides trifurcatus* gen. nov., sp. nov. Pereopods 4–6 of female and male.

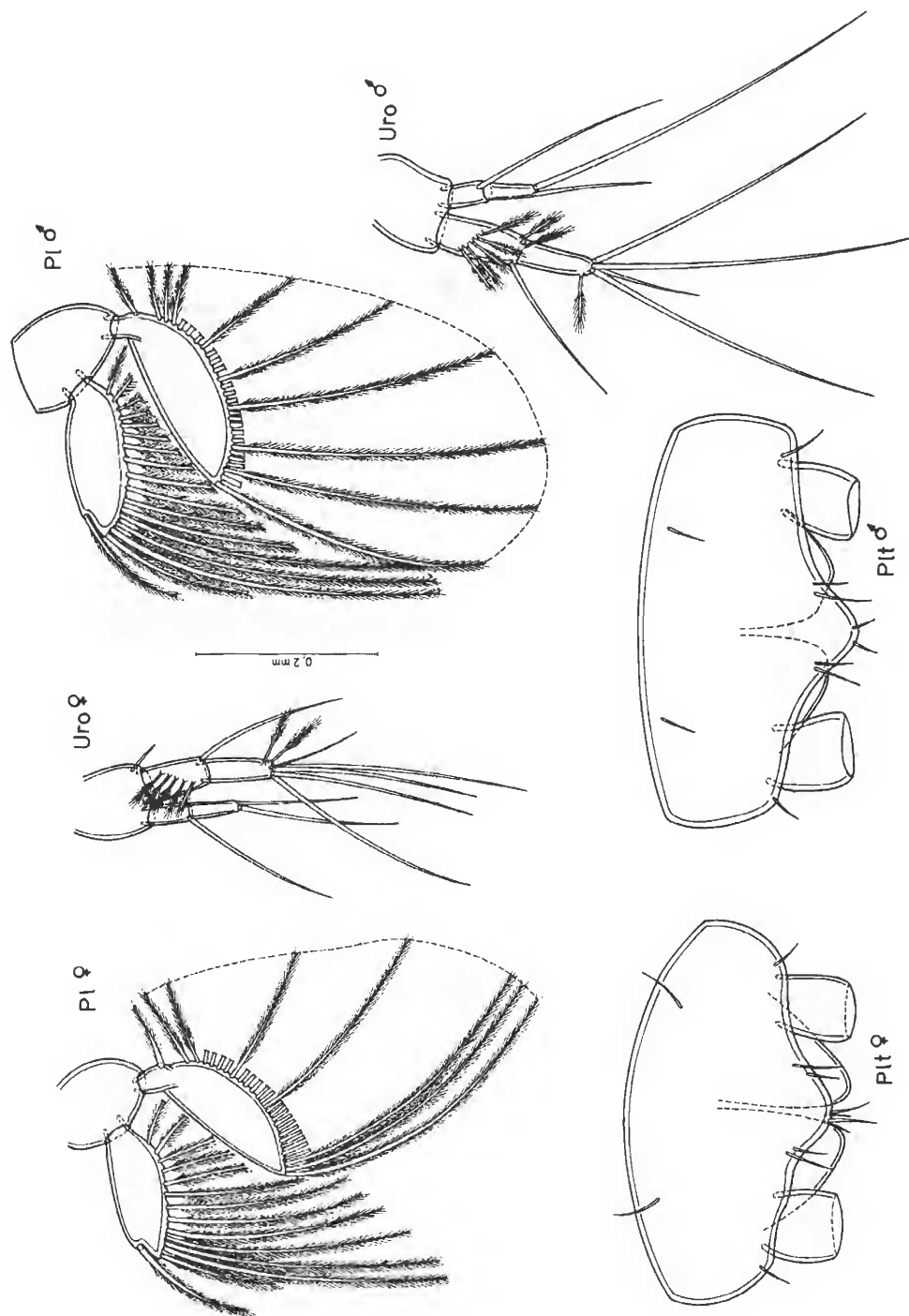


Figure 7. *Nototanaoides trifurcatus* gen. nov., sp. nov. Female and male pleopods (Pl), uropods (Uro), and pleotelson (Plt).

Cephalothorax — Elongate, nearly 1.3 times longer than broad, gently rounded posteriorly and narrowed anteriorly, eyelobes relatively large, single small seta on lateral margin immediately posterior to each eyelobe, rostrum indistinct.

Pereonites — All pereonites with one seta at anterior corner, lateral borders rounded with no spines or processes; first pereonite about 3.6 times broader than long, anterior and posterior border smooth, concave; second slightly more than 2 times as broad as long; third approximately 1.9 times as broad as long, greatest width in anterior half; fourth 1.5 times as broad as long; fifth 1.7 times broader than long; sixth 1.8 times broader than long, greatest width in posterior third.

Pleonites — 5 tergites visible dorsally, all of same size, each nearly 4 times broader than long, each segment armed laterally with 2–5 small setae.

Antenna 1 (Fig. 2) — 3-segmented; segment 1 longer than remaining 2 combined, nearly 4 times longer than broad, slightly curved sternally (ventrally), midsternally with 1 plumose seta, and distally with 3 strong plumose setae and 1 long naked seta, tergal border with 1 seta in the middle and distally; second segment smaller, about 2 times longer than broad, sternal margin distally with 4 aesthetascs, tergal margin with 2 naked setae and 1 plumose seta distally; third segment relatively small, but 2.3 times as long as broad, distally with 1 aesthetasc, 3 long and 3 short naked setae, and 1 plumose seta.

Antenna 2 (Fig. 1) — 6-segmented; first segment small, as long as broad, partly fused with cephalothorax; second relatively large, laterally depressed with tergal border flattened, nearly 1.5 times as long as broad, tergal margin with 1 seta, and some groups of minute setae distally; third, as long as broad, with 1 seta distally at tergal margin; fourth segment elongate and curved medially, 4 times as long as broad, with 1 plumose seta medially, and 5 naked setae as well as 1 plumose seta distally; fifth small, as long as broad, with 2 long setae distally; sixth minute, conical, with 1 short and 3 longer setae.

Labrum (Fig. 3) — Hood-shaped, covered with very fine setae.

Mandibles (Fig. 3) — Robust, *pars molaris* well-developed, having crushing area surrounded with strong raised margin, $\frac{3}{4}$ of margin notched; left mandible with strong crenulate *lacinia mobilis* and well-developed *pars incisiva*; right mandible without *lacinia mobilis* (fused with the *pars incisiva*?), with strong bifid crenulate *pars incisiva*.

Labium (Fig. 3) — With inner and reduced outer lobe; inner lobe deeply incised in middle, distal part covered with groups of very small setae.

Maxilla 1 (Fig. 3) — With endite and uniaarticulate palp; endite with 9 normal spines; palp nearly as long as endite, with 2 relatively short setae.

Maxilla 2 (Fig. 3) — Of normal size for family, oval, lacking setae.

Maxilliped (Fig. 3) — Without coxae, well-developed;

basis fused medially, with 1 long seta near articulation of palp; endite of normal size, distal third unfused medially, each side with 2 distal setae, 2 membranous hemispherical structures, and very small setae on distolateral margin. Palp with 4 articles; first article slightly longer than broad, without setae; second triangular, outer margin with 1 seta, inner margin with 2 setae and 1 strong, 3-pointed ("trifurcate") spine; third segment 1.25 times longer than broad, inner border with 3 serrate setae and 1 naked seta; fourth small, with 1 short seta on outer border, and 5 serrate setae on inner border.

Epignath (Fig. 3) — Falciform, with minute hairs at tip.

Cheliped (Fig. 4) — Strongly developed; sidepiece large, behind proximal conjunction of basis; latter 1.8 times longer than broad, no seta; merus triangular, elongate, and reaching nearly to middle of carpus, 1 rostral seta; carpus 1.7 times longer than broad, tergal border with 1 distal and 1 proximal seta, sternal border with 1 rostral and 1 caudal posterior seta; propodus of normal size, fixed finger with strong spine at tip, tergal border with 3 rostral setae, sternal border with 6 rostral setae, caudally with 1 seta near articulation of dactylus, comb consisting of 13 (variable) short, serrated setae and 1 long serrate seta; dactylus curved, tip strongly calcified and colored more or less dark brown, 1 rostral seta.

Pereopod 1 (Fig. 5) — Slender, coxa small, not fused with pereonite, without setae; basis slender, 3.7 times longer than broad, tergal border with 1 rostral naked seta and 1 plumose seta; ischium small, with 1 tergal seta; merus elongate, 1.25 times longer than broad, sternal border with 1 rostral seta distally; carpus 1.7 times longer than broad, distally with 1 rostral and 1 caudal seta sternally as well as tergally; dactylus with spine, nearly as long as propodus, with 1 small seta proximally.

Pereopod 2 (Fig. 5) — Coxa small, not fused with pereonite, without setae; basis nearly 3 times as long as broad, sternal border with 3 short setae proximally; ischium small, with 1 tergal seta; merus 1.2 times longer than broad, tergal border distally with 1 rostral and caudal seta; carpus 1.7 times longer than broad, distally with 1 rostral and caudal spine tergally as well as sternally, sternal third with groups of tiny setae; propodus 3.3 times longer than broad, tergal border with 1 spine distally; dactylus curved, reaching approximately $\frac{2}{3}$ length of propodus.

Pereopod 3 (Fig. 5) — Proportion and armament as in P.2, but carpal spines slightly larger.

Pereopod 4 (Fig. 6) — Coxa fused with pereonite; basis 3 times longer than broad, sternal border with 2 plumose setae proximally and tergal border with 2 plumose setae distally; ischium small, with 2 tergal setae; merus nearly 2 times longer than broad, distally with 1 rostral and 1 tergal spine sternally and tergally, 1 distal seta at sternal border; propodus 3 times longer than broad, distally tergal margin with 1 rostral and 1 tergal spine, sternal margin with feathered hair in middle and 1 long distal seta, distal third

with groups of minute setae; dactylus and spine fused as claw, half as long as propodus.

Pereopod 5 (Fig. 6) — Proportions and armament as in P.4; except merus, bearing distally 1 rostral and 1 caudal seta on sternal border, and propodus bearing 2 plumose setae.

Pereopod 6 (Fig. 6) — Proportions and armament as in P.4 and P.5, except for propodus bearing 1 large spine and 3 additional short spines at sternal border distally.

Pleopods (Fig. 7) — All 5 pairs of pleopods similarly developed; basis nearly as long as broad, without setae; exopod uniaarticulate, without setae on inner border, with many setae on outer border, most proximal 1 stouter than others, separated by gap from them; endopod uniaarticulate, with 1 seta at distal inner border, many setae on outer border.

Pleotelson (Fig. 7) — Normally developed, slightly more than twice as broad as long, caudal lobe prominent, with 2 small and 2 longer setae, with 2 setae medial to, and 1 seta lateral to, articulation of uropod; 2 additional setae near border with fifth pleonite.

Uropods (Fig. 7) — Short, biramous. Protopod (basis) developed normally, 1.25 times longer than broad, with 1 small seta near articulation of exopodite. Endopodite short, 2-segmented; first segment with 1 long seta distally; second segment with 2 long setae at tip. Exopodite 2-segmented; first segment about twice as long as broad, with oblique row of 5 plumose setae, and 1 long distolateral seta; second segment nearly 3 times as long as broad, with 1 short naked seta, 2 plumose setae, and 4 long setae at tip.

Description of male Type 1 (paratype) (Figs. 1–7).

Body — Length of "adult" males (= copulatory ♂ Type B? of Sieg 1984) 3.2–3.7 mm; approximately 6 times longer than broad, shape different than that of the female (Fig. 1).

Cephalothorax — Elongate, approximately 2/5 total length of animal, anterior half laterally compressed, borders parallel, eyelobes large, with small seta adjacent to it, posterior half strongly inflated, bearing carapace fold, 1 small seta present.

Pereonites — All 6 pereonites with 1 seta on anterior corner, borders much more rounded than in female; first pereonite small, nearly 4.5 times longer than broad, anterior and posterior border smoothly concave; second and third pereonites about 2.6 times and 1.8 times broader than long, respectively, with lateral borders strongly convex; fourth and fifth pereonites 1.7 and 1.6 times broader than long, respectively, with anterior and posterior part laced, lateral borders convex; sixth twice as broad as long, only anterior part laced.

Pleonites — Similar to female, but only 3 times broader than long.

Antenna 1 (Fig. 2) — 4-segmented, elongate, much stronger than female; first article longer than remaining ones, 4.5 times longer than broad, sternal margin with 3 plumose setae at proximal 1/3, with 4 plumose setae and 1

long seta in middle and with 3 plumose setae and 1 long seta distally, tergal border with 1 seta in middle and 1 seta and 1 feathered hair distally; second segment 1.8 times longer, distally with 2 small setae tergally and 1 longer seta sternally; third segment small, annular, with 1 aesthetasc; fourth segment 2.3 times longer than broad at the basis with scale bearing 4 aesthetascs, with 1 additional aesthetasc, 4 longer and 2 shorter setae distally.

Antenna 2 (Fig. 1) — Similar to female, except for some minor differences distally (plumose setae instead of naked setae at distal end of antepenultimate segment).

Mouthparts — Greatly reduced, vestigial.

Maxilliped (Fig. 3) — Strongly reduced; basis small, fused medially, with 1 long seta distally on each side (near original articulation of palp); palp missing; endite totally fused, with 2 long setae distally.

Epignath (Fig. 3) — As in the female, but larger.

Cheliped (Fig. 4) — Much larger than in female, with carpus much more voluminous; propodus with reduced spine at tip of fixed finger, comb more developed, consisting of about 22 short and 1 long setae; dactyl with rounded tooth.

Pereopods 1–6 (Figs. 5–6) — Proportions and armament, except for basis, as in female; basis of all pereopods stronger than in female, thickness of basis increasing from P.1–P.6, especially in P.4–P.6, rostral and caudal part of sternal margin prominent, U-shaped in cross section forming groove for carpus and propodus when leg is retracted.

Pleopods, uropods (Fig. 7) — As in female.

Pleotelson (Fig. 7) — Shorter than in female, 2.5 times broader than long; armament as in female.

Description of male Type 2 (paratype) (Figs. 1–2, 4).

Body (Fig. 1) — Distinctly smaller, length approximately 2 mm; cephalothorax more elongate as in female, but less than in "adult" male (male 1 stage), anterior half laterally compressed; shape of pereonites similar to female.

Appendages — Antenna 1 (Fig. 2) similar to "adult" male Type 1, but proportionally smaller; mouthparts reduced, maxilliped also reduced; cheliped small (Fig. 4), more like that of female; pereopods, pleopods, and uropods similar to the "adult" male.

Remarks — The morphological comparisons have already been made in the discussion of the relationship of *Nototanoides* to other nototanaid genera. Based on the work of Sieg (1984a), it appears that the male Type 1 and male Type 2 of *Nototanoides* correspond to the "primary male" and "secondary male" (type B and C), respectively. *Nototanoides trifurcatus*, like species of *Nototanaids*, appears to follow the type of protogynous development (Sieg 1984b) represented by *Heterotanaids oerstedti* (Krøyer, 1842). Like the males of *Nototanaids*, those of *Nototanoides* have chelipeds that differ morphologically only slightly from those of the females. Additional male forms can be recognized only by their measurements.

Ecological Notes — The specimens of *Nototanoides trifurcatus* examined during this study came from carbonate sands and rocks in depths ranging from 19 to 190 m. Off the Texas coast (East Flower Garden Bank), large populations of this and at least 10 other tanaidacean species were associated with a natural anoxic, sulfurous brine seep. For detailed discussion of this unique habitat, see Powell et al. (1982).

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